

1 CLAIMS

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3 1. Apparatus for the measurement of vascular
4 impedance of the ocular micro circulation *in vivo*,
5 comprising intra-ocular pressure measurement means
6 from which a pressure pulse waveform is calculable,
7 blood velocity profile measurement means for
8 measuring the linear blood flow velocity in the
9 retrobulbar circulation, and means for calculating a
10 vascular impedance modulus from the pressure pulse
11 waveform and the linear blood flow velocity.

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13 2. Apparatus as claimed in claim 1, wherein the
14 intra-ocular pressure measurement means is suitable
15 for measuring the maximum and minimum pressure
16 values of the pulse profile to calculate a mean
17 intra-ocular pressure.

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19 3. Apparatus as claimed in claim 1 or claim 2,
20 suitable for measuring how the pressure pulse
21 waveform and the linear blood flow velocity vary
22 over the period of a respiratory cycle.

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24 4. Apparatus as claimed in any preceding claim,
25 wherein a solid state transducer is used to measure
26 intra-ocular pressure.

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28 5. Apparatus as claimed in claim 4, wherein a
29 suitable solid state transducer operates in
30 conjunction with a suitable telemetry system to
31 process the data.

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1 6. Apparatus as claimed in any of claims 1 to 3,
2 wherein an ocular pneumotonometer is used to measure
3 intra-ocular pressure.

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5 7. Apparatus as claimed in any preceding claim,
6 wherein the blood velocity profile measurement means
7 is an ultrasound device.

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9 8. Apparatus as claimed in claim 7, wherein the
10 ultrasound device is a doppler ultrasound imager.

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12 9. Apparatus as claimed in any preceding claim
13 further comprising motion picture generation means
14 to produce moving images of an artery.

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16 10. Apparatus as claimed in claim 9, wherein the
17 moving images are capable of being used to ensure
18 that a user of the apparatus can accurately identify
19 the location of an artery.

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21 11. Apparatus as claimed in any preceding claim,
22 wherein the change in the pulsatile intra-ocular
23 pressure waveform and the linear blood flow velocity
24 are measured sequentially.

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26 12. Apparatus as claimed in any preceding claim,
27 wherein the means for calculating the vascular
28 impedance modulus comprises means for;

29 obtaining the fourier transform of the intra-
30 ocular pressure pulse waveform and the linear blood
31 flow velocity and dividing the transformed values of
32 the pulsatile change in the intra-ocular pressure

1 pulse by the transformed retrobulbar blood flow
2 velocity.

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4 13. Apparatus as claimed in any preceding claim,
5 wherein the pulsatile change in intra-ocular
6 pressure has a phase associated therewith.

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8 14. Apparatus as claimed in any preceding claim,
9 wherein the intra-ocular blood velocity has a phase
10 associated therewith.

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12 15. A method for the measurement of vascular
13 impedance of the ocular micro circulation *in vivo*,
14 comprising the steps of: measuring the intra-ocular
15 pressure pulse waveform of the ocular network;
16 measuring the linear blood flow velocity in the
17 retrobulbar circulation; and
18 calculating the vascular impedance modulus from the
19 intra ocular pressure pulse waveform and the linear
20 blood flow velocity waveform.

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22 16. A method as claimed in claim 15, wherein the
23 pressure pulse waveform and the linear blood flow
24 velocity are measured over the period of a
25 respiratory cycle, and their variation therewith is
26 measured.

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28 17. A method as claimed in claim 16, wherein the
29 variations are used in the calculation of the
30 vascular impedance modulus.

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1 18. A method as claimed in any of claims 15 to 17,
2 further comprising the steps of recording moving
3 images of an artery.
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5 19. A method as claimed in claim 18, wherein the
6 moving images are used to accurately identify the
7 location of an artery.
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9 20. A method as claimed in any of claims 15 to 19,
10 wherein the change in the pulsatile intra-ocular
11 pressure waveform and the linear blood flow velocity
12 are measured sequentially.
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14 21. A method as claimed in any of claims 15 to 20,
15 wherein the step of calculating the vascular
16 impedance modulus comprises the steps of;
17 obtaining the fourier transform of the intra-ocular
18 pressure pulse waveform and the linear blood flow
19 velocity and dividing the transformed values of the
20 pulsatile change in the intra-ocular pressure pulse
21 by the transformed retrobulbar blood flow velocity.
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